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Arc Flash Myths and Misconceptions

Past experience does not always predict future events. This is especially true in the myths and misconceptions surrounding Arc Flash that we hear as we travel the country performing analyses and educating workers on NFPA 70E. These myths, which are numerous, sometimes originate in the minds of technical people who try to apply their past experience and education to the behavior of an Arc Flash. This doesn't always work. Many times we hear an engineer, sometimes our own, express surprise at the unpredictability of such an event. Another source of misinformation comes from people selling products such as fuses, circuit breakers, infrared cameras, fire resistant clothing, and other equipment to protect against electrical hazards. It is easy to see how a sales pitch may lead a potential client to believe something untrue.

Whatever the source, it is imperative these myths are debunked. What follows is an attempt to do just that to five of the most common misapprehensions, based on our experience performing hundreds of Arc Flash Analyses in hundreds of locations all across the United States, Canada and the Caribbean.

Myth #1 - A Current Limiting Fuse Will Always Reduce The Arc Flash Hazard:

This is simply not true. We have met people who were told that if they replaced all of their fuses with the current limiting type they would not need to purchase fire resistant personal protective equipment (PPE) nor do an Arc Flash Analysis. This could not be more false. In determining the extent of a burn injury, the duration is as important as the temperature of the Arc Flash and the distance from it. In our experience, current limiting fuses do not address the duration component of an Arc Flash thoroughly enough.

A current limiting fuse operates by clearing the fault very quickly when the fault current reaches what is known as the current limiting range. These fuses could even have time delay characteristics. In our experience looking at hundreds of facilities, the serious Arc Flash exposures are created when the fault current is low and does not reach the current limiting range of the fuse. When this occurs, the fuse does not clear the fault quickly, which results in lengthening the duration of the Arc Flash.

A current limiting fuse is a quality fuse and we highly recommend its use whenever possible; however, they are certainly not a cure-all for Arc Flash hazards. A current limiting fuse will mitigate an Arc Flash hazard only if the fault current is high enough. To their credit, fuse companies do not try to hide this fact in their technical documentation. Therefore, the money you spend to buy these fuses is wasted if the intent is to remove Arc Flash hazards.

Myth #2 – The Arc Flash Hazard Downstream Will Always Be Less Than Upstream:

Sometimes the higher Arc Flash hazard will be downstream in your electrical system. Some facilities ask us to come in and do a study down to the point where the hazard level is a One or Two and then stop. We refuse to do this incomplete study because

there could certainly be exposure greater than Category 2 downstream. An example of such an exposure occurred in a factory of a defense contractor where a 208/120 volt panel served single phase loads in an office area. It was fed from a 300 KVA transformer next to it with no disconnect between transformer secondary and the panel. The panel, with dead-front removed, was a Category 4. That requires a full flash suit, commonly referred to as a "space suit" among electricians. The panel that fed this Category 4 location was a Category 2. This panel was installed per the National Electrical Code and violated no local codes. The combination of no secondary protection, and the clearing time of the over-current protective device feeding the transformer, created a tremendous downstream Arc Flash exposure.

Myth #3 – An Arc Flash Analysis Is All About Labeling Panels:

An Arc Flash Analysis is more than an engineering study that will result in the labeling of panels. It is a safety survey in which you identify hazards in your facility with the ultimate goal of preventing injuries. Some companies speak of an Arc Flash study that includes only labeling panels to prescribe the correct PPE. What a waste of money. To prevent injuries in your facility, the study should be much more than that. Whomever does your analysis must not only identify the hazards; they should also make recommendations on how to mitigate these hazards. An Arc Flash Analysis is about hazard reduction, not wardrobe selection.

Myth #4 – We Don't Have To Do An Arc Flash Analysis Because We Do Regular Infrared Scans Of Our Equipment:

I'm not even sure where to start with this one. We hear this myth occasionally due to our contact with so many facility safety and maintenance people.

Arc Flash can be caused by equipment failure such as loose connections. An IR scan for hot spots could certainly find this and you could avoid an arc flash. However, a large number of Arc Flash injuries are caused by human error. I do not believe data exists on this, but by speaking to thousands of people across the country during presentations of Arc Flash and 70E training, I always ask for personal experiences with Arc Flash. Most of the injuries in these impromptu case studies are caused by human error. An IR scan you had performed a month ago is not going to protect an electrician in any way if he accidentally drops his screw driver into a live panel. We strongly recommend regular IR scans of your equipment, but they will not remove the need for an Arc Flash Analysis.

Myth #5 – NFPA 70E Is Mostly About Arc Flash:

If I had to summarize what the latest edition of 70E is trying to accomplish, I would have to say: "Reduce the amount of live work." I would not say: "Arc Flash." Even though there are some huge changes in the standard for most facilities concerning Arc Flash and the proper PPE, it is really about trying to get people to de-energize the circuit first. Putting the circuit in an electrically safe condition is the first line of defense. The PPE, in the words of the IEEE, "is the last line of defense."

Of course, another useful line of defense is proper knowledge and understanding of Arc Flash and NFPA 70E. I hope the above examples have clarified for you some of the ambiguity often associated with this topic.